MyWord: Supporting the Interest-based Learning of Words through a Personal Visual Dictionary

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Abstract
In this research we explore how interest-based interactive technologies can support learning, particularly for children for whom receptive language and the pace of the general curriculum can be challenging. We designed and iteratively developed MyWord, a visual dictionary tablet app, which supports the exploration of words through images that represent a child's interest. The prototype was derived from a parent's concept and a one-month deployment with her child. Early findings indicate that MyWord has the potential to support collaborative image curation, browsing and discovery of interests, and writing and spelling practices. This paper bridges knowledge between competency-based learning approaches and technology design. We conclude with reflections on early use of the MyWord app and pose questions to direct future work.

Author Keywords
Child-Computer Interaction; Visual Dictionary; Intellectual Disability; Autism; Language Development

ACM Classification Keywords
K.4.2 Social Issues: Assistive technologies for persons with disabilities

Figure 1. MyWord Homepage with profile and search buttons

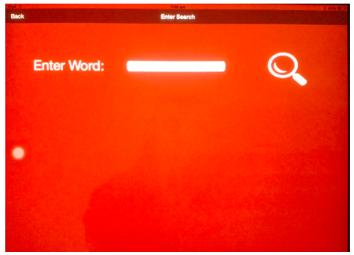

Figure 2. Search bar leading to Google Image search

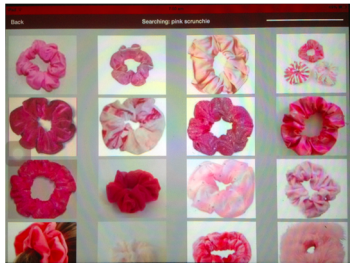

Figure 3. Images returned from search for 'Pink Scrunchie'

Introduction

There is increasing interest in designing for learning through emerging interactive technologies such as virtual reality [18], robotics [7] and games [8]. While these technologies offer exciting design opportunities, there is a lack of focus on what is exciting to children with intellectual and developmental disabilities (ID/DD) i.e. their personal interests.

Learning technologies are often developed to teach very specific, pre-defined and quantifiable content. However, if the learner is not interested in or motivated by this pre-defined content, it can be a barrier to learning. This is particularly true in ID/DD context, whereby individuals typically have very specific areas of interest and knowledge, which can provide a great source of motivation. Those on the autism spectrum typically have repetitive behaviours, interests and/or activities [4, 5]. While speech and language are highly pursued concepts within the realm of education, much emphasis is placed on tasks that can be measured and assessed, while very little is placed on the child's own interests, strengths and capabilities.

Within HCI, we see a similar pattern, whereby existing apps tend to focus on quantifiable and testable outcomes regarding literacy, assessment and intervention [12, 13]. Although these designs are useful, we note the lack of opportunity for the child to shape their own learning. As we move towards the social model of disability, it is perhaps useful to look at how our technology design can itself become more holistic, strengths-based and person-centred.

Here we present the concept, design and early experience of MyWord, a personal visual dictionary app, which applies a strengths-based approach to engage children with ID/DD with written words (see Figs 1-5).

Related Work

Visual supports, shown to support children with autism in the learning process, are defined as "those things we see that enhance the communication process" [5, p.179]. Some HCI researchers [14, 4] note that technologies often seem to cater solely to verbal thinkers, missing the value of visuals in the process of designing for cognition. Work within DIS has begun to explore the use of visualisations to support language and communication with children with autism through technology [2, 3, 9, 11]. However, many of these designs focus on designer-determined words and phrases, and not on words personally relevant or customisable to the child. Augmentative and Alternative Communication (AAC) aims to enrich communication with technology, however, AAC tools can often be advanced, expensive and inflexible (i.e. not easily customisable to each child's individual needs) [4, 10]. Here, we are interested in developing a low-tech, inexpensive, flexible, customisable, visually-based technology to support language acquisition and communication.

Method

Design Inspiration

We present a preliminary study into the development of a visual dictionary prototype app, MyWord. The design was inspired in part by ongoing work in classrooms with children with autism, but more so by the design thinking of one parent with a child with ID/DD, who noted the importance of words which are personally significant to the child, as opposed to words which are pre-defined. The child would constantly ask the parent

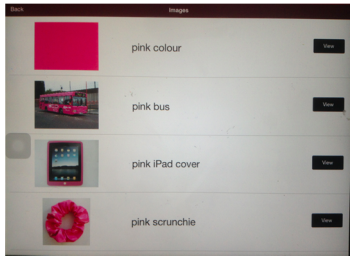

Figure 4. All images gathered under the child's favourite colour - pink

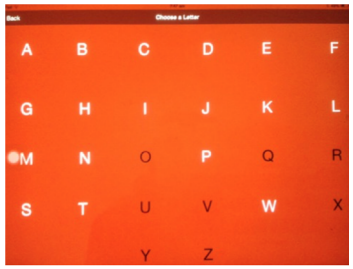

Figure 5. The main alphabet view - letters can be clicked on to lead to saved images

Figure 6. The child spontaneously handwriting from the app

to type search terms into Google in order to help her search for particular images which were stimulating. The parent recognised the child's strong motivation to find images of interest, combined with a reluctance and difficulty to spell, and wondered if the child's intrinsic motivation could be mobilised through an interface that assisted the child to spell in order to find images of interest. To date, we have carried out a pilot single-user study [16] on the MyWord concrete prototype. The participant (female, aged 13 with an ID) was shown the MyWord prototype and provided with guidance on how to use the app.

MyWord Prototype

It was our intention to keep design options open-ended in order to allow users to create personal meaning [15]. The prototype which emerged, MyWord, is a visual dictionary app for the iPad. It can be used to build a collection of terms and images based on people's interests and potentially as a communication, memory or learning tool, assisting in the development of vocabulary, literacy and oral language skills. The app has a search bar leading to Google Images (Fig 1, 2) in which safe search is enabled. The user can search for an image using the key word or phrase and select an image they wish to be added to the dictionary under that term. In the second iteration, the term can be changed in the dictionary to whatever the user prefers. Other refinements allow the user to take or upload a personal photo from their iPad gallery instead of a searched image [17]. These images are then searchable from the main menu, which is a layout of the alphabet (Fig 5). Finally, another refinement allows words to be spoken out by the dictionary and also for children to record a voice clip of themselves saying the word.

Pilot Study Findings

Collaborative Curation

Parent and child worked together to populate the dictionary, with child dictating the term to be searched for and parent typing it in. The child then chose which images were to be downloaded and spent time perusing these. The child could find words through the alphabet interface as she knew the first letter of words, but often could not spell them for the initial search. She then enjoyed browsing her favourite pictures in the dictionary (e.g. 'pink scrunchie', Fig. 3 and 4). This finding is relative to the child's particular competencies: others may use the search functionality independently. We suggest that later versions could find more ways to scaffold independent search, however, in this instance, search developed into a sharing activity between parent and child. After using for a couple of hours in total over about 5 days, they built up about 20 words and then gradually added more over the rest of the month.

Spontaneous Use for Handwriting Support

The parent reported that the child began to use the app spontaneously and without encouragement. In one instance, she was alerted to her daughter working in the dining room through hearing her "concentration noise", a loud humming, and, when she investigated, found that the child had taken out her MyWord app and was copying words onto a sheet of paper (Fig. 6). The child diligently copied the word 'firetruck' (a great interest of hers) from the iPad to her list, saying each letter as she wrote and then saying with satisfaction "*What does that spell? Firetruck!*", answering herself.

Ownership and Exploration of New Words

During video observations, the child came across a photo of 'jelly' that her mum had entered into the

dictionary. On video, the child exclaimed: *"Jelly?! Who's that idea?".* The child was surprised to see an image there which wasn't selected by her. This is an example of the potential for the personal nature of the MyWord tool. This was extended by her browsing through images as sensory feedback. On encountering D for 'Double Decker Couch' (a favourite item from The Lego Movie) the child exclaimed with glee *"Oh, Emmett!"* - the name of her favourite character from the movie.

Discussion

We have presented a concept that is a genuine Work-in-Progress. The app is undergoing finishing touches before it is put on the App store for free, in order to make it easier to trial more systematically. Based on our iterative design work and preliminary short trials, MyWord appears to have three key aspects; it is interest-based; it is visual; it connects the interest to a visual through a word. Although a simple concept, this enables individuals with ID/DD and the people around them to see how their interests and language abilities change over time. Rather than comparing to norms and metrics made across populations, it looks at individual vocabulary from a holistic perspective; it tells us who this person is and what motivates them.

One perceived drawback of an interest-based approach is that the very specific interests of individuals with ID/DD can seem to define or even consume them. However, in line with Greenspan [1], we suggest that this interest may be leveraged in order to expand their area of interest. For example, if a child is very interested in washing machines, why not work from this area of strength, by asking questions about other things in this context? We could ask "What goes into the washing machine?" then "Who wears the clothes?" etc. Thus we can expand and extend the area of interest to encourage learning words associated with the interest and beyond. A key question is how the app might be used in practice in the long run. We certainly make no claim that it is a standalone app for teaching reading, but, MyWord may potentially support and motivate connectedness to words while learning.

Future Work

We see potential for MyWord to aid in the sense-making of not only words but complete phrases [6]. Although design was inspired by the context of designing for children with autism, we feel this could be much more broadly applicable, providing support to adults with ID/DD and perhaps all children in education contexts. We seek to extend MyWord to support the exploration of new interests. For example, a shared class dictionary can be used by the class teacher interactively, ensuring all children's interests are represented and their strengths played to. We also propose a send and share function for use with friends and proxies and perhaps a gamified element to encourage independent search.

Bridging knowledge between education and interactive systems design is critical to designing effective learning technologies. This research promotes a competence paradigm of revealing and engaging children's competencies rather than a deficit model which shows what they are yet to master. Thus, we suggest that design which is person-centred, interests-based and strengths-based can lead us to a more holistic approach to supporting language and communication with children for whom perhaps the letter D is not for 'Dog', but for 'Double-Decker Couch' instead.

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